

## University of Groningen

### Condition-based production and maintenance decisions

uit het Broek, Michiel

DOI:  
[10.33612/diss.118424026](https://doi.org/10.33612/diss.118424026)

**IMPORTANT NOTE:** You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
2020

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*  
uit het Broek, M. (2020). *Condition-based production and maintenance decisions*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen, SOM research school.  
<https://doi.org/10.33612/diss.118424026>

#### Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

#### Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

# Bibliography

- Abbott, S. 2015. *Understanding Analysis*, chap. Additional Topics. Springer, New York, 214–215.
- Alaswad, S., Y. Xiang. 2017. A review on condition-based maintenance optimization models for stochastically deteriorating system. *Reliability Engineering & System Safety* **157** 54–63.
- Alla, A. A., M. Quandt, M. Lütjen. 2013. Simulation-based aggregate installation planning of offshore wind farms. *International Journal of Energy* **72** 23–30.
- Allahverdi, A. 2015. The third comprehensive survey on scheduling problems with setup times/costs. *European Journal of Operational Research* **246**(2) 345–378.
- Allahverdi, A., C. T. Ng, T. C. E. Cheng, M. Y. Kovalyov. 2008. A survey of scheduling problems with setup times or costs. *European Journal of Operational Research* **187**(3) 985–1032.
- Ang, C. W., C. K. Tham. 2007. Analysis and optimization of service availability in a ha cluster with load-dependent machine availability. *IEEE Transactions on Parallel and Distributed Systems* **18**(9) 1307–1319.
- Ascheuer, N., M. Fischetti, M. Grötschel. 2001. Solving the asymmetric travelling salesman problem with time windows by branch-and-cut. *Mathematical Programming* **90**(3) 475–506.
- Ayed, S., D. Sofiene, R. Nidhal. 2012. Joint optimisation of maintenance and production policies considering random demand and variable production rate. *International Journal of Production Research* **50**(23) 6870–6885.
- Balachandran, K. R. 1973. Control policies for a single server system. *Management Science* **19**(9) 1013–1018.
- Balas, E. 1989. The asymmetric assignment problem and some new facets of the traveling salesman polytope on a directed graph. *SIAM Journal on Discrete Mathematics* **2**(4) 425–451.
- Balas, E., M. Fischetti. 1993. A lifting procedure for the asymmetric traveling salesman polytope and a large new class of facets. *Mathematical Programming* **58**(1-3) 325–352.
- Balas, E., M. Fischetti. 2007. Polyhedral theory for the asymmetric traveling salesman problem. G. Gutin, A.P. Punnen, eds., *The traveling salesman problem and its variations*. Springer, Boston, MA, 117–168.

- Baldacci, R., A. Mingozzi. 2009. A unified exact method for solving different classes of vehicle routing problems. *Mathematical Programming* **120**(2) 347.
- Barlow, E., D. T. Öztürk, M. Revie, E. Boulougouris, A. H. Day, K. Akartunalı. 2015. Exploring the impact of innovative developments to the installation process for an offshore wind farm. *Ocean Engineering* **109** 623–634.
- Basso, F., S. D'Amours, M. Rönnqvist, A. Weintraub. 2019. A survey on obstacles and difficulties of practical implementation of horizontal collaboration in logistics. *International Transactions in Operational Research* **26**(3) 775–793.
- Batun, S., L. M. Maillart. 2012. Reassessing tradeoffs inherent to simultaneous maintenance and production planning. *Production and Operations Management* **21**(2) 396–403.
- Beganovic, N., D. Söffker. 2016. Structural health management utilization for lifetime prognosis and advanced control strategy deployment of wind turbines: An overview and outlook concerning actual methods, tools, and obtained results. *Renewable and Sustainable Energy Reviews* **64** 68–83.
- Beinke, T., A. A. Alla, M. Freitag. 2017. Resource sharing in the logistics of the offshore wind farm installation process based on a simulation study. *International Journal of e-Navigation and Maritime Economy* **7** 42–54.
- Bektaş, T., L. Gouveia, A. Martínez-Sykora, J. J. Salazar-González. 2019. Balanced vehicle routing: Polyhedral analysis and branch-and-cut algorithm. *European Journal of Operational Research* **273**(2) 452–463.
- Bektaş, T., L. Gouveia, D. Santos. 2017. New path elimination constraints for multi-depot routing problems. *Networks* **70**(3) 246–261.
- Belenguer, J. M., E. Benavent, C. Prins, C. Prodhon, R. W. Calvo. 2011. A branch-and-cut method for the capacitated location-routing problem. *Computers & Operations Research* **38**(6) 931–941.
- Benavent, E., A. Martínez. 2013. Multi-depot multiple tsp: a polyhedral study and computational results. *Annals of Operations Research* **207**(1) 7–25.
- Bevilacqua, M., M. Braglia. 2000. The analytic hierarchy process applied to maintenance strategy selection. *Reliability Engineering & System Safety* **70**(1) 71–83.
- Bischof, W. 2001. Analysis of  $M/G/1$ -queues with setup times and vacations under six different service disciplines. *Queueing Systems* **39**(4) 265–301.
- Blanco, M. I. 2009. The economics of wind energy. *Renewable and Sustainable Energy Reviews* **13**(6-7) 1372–1382.
- Bosco, A., D. Laganà, R. Musmanno, F. Vocaturo. 2013. Modeling and solving the mixed capacitated general routing problem. *Optimization Letters* **7**(7) 1451–1469.
- Boukas, E. K., Z. K. Liu. 2001. Production and maintenance control for manufacturing systems. *IEEE Transactions on Automatic Control* **46**(9) 1455–1460.

- Boukas, E. K., Q. Zhang, G. Yin. 1995. Robust production and maintenance planning in stochastic manufacturing systems. *IEEE Transactions on Automatic Control* **40**(6) 1098–1102.
- Bouvard, K., S. Artus, C. Bérenguer, V. Cocquempot. 2011. Condition-based dynamic maintenance operations planning & grouping. application to commercial heavy vehicles. *Reliability Engineering & System Safety* **96**(6) 601–610.
- Burton, T., N. Jenkins, D. Sharpe, E. Bossanyi. 2011. *Wind energy handbook*. John Wiley & Sons.
- Cappanera, P., L. Gouveia, M. G. Scutellà. 2013. Models and valid inequalities to asymmetric skill-based routing problems. *EURO Journal on Transportation and Logistics* **2**(1) 29–55.
- Cappanera, P., M. G. Scutellà. 2014. Joint assignment, scheduling, and routing models to home care optimization: A pattern-based approach. *Transportation Science* **49**(4) 830–852.
- Castanier, B., A. Grall, C. Bérenguer. 2005. A condition-based maintenance policy with non-periodic inspections for a two-unit series system. *Reliability Engineering & System Safety* **87**(1) 109–120.
- Choi, T. M., S. W. Wallace, Y. Wang. 2018. Big data analytics in operations management. *Production and Operations Management* **27**(10) 1868–1883.
- Contardo, C., J-F. Cordeau, B. Gendron. 2014. An exact algorithm based on cut-and-column generation for the capacitated location-routing problem. *INFORMS Journal on Computing* **26**(1) 88–102.
- Corberán, A., I. Plana, J. M. Sanchis. 2008. The windy general routing polyhedron: A global view of many known arc routing polyhedra. *SIAM Journal on Discrete Mathematics* **22**(2) 606–628.
- Crowder, M., J. Lawless. 2007. On a scheme for predictive maintenance. *European Journal of Operational Research* **176**(3) 1713–1722.
- Cruijssen, F., W. Dullaert, H. Fleuren. 2007. Horizontal cooperation in transport and logistics: a literature review. *Transportation Journal* **46**(3) 22–39.
- Dalgic, Y., I. A. Dinwoodie, I. Lazakis, D. McMillan, M. Revie. 2014. Optimum CTV fleet selection for offshore wind farm O&M activities. *ESREL 2014* .
- Dalgic, Y., I. Lazakis, I. Dinwoodie, D. McMillan, M. Revie. 2015a. Advanced logistics planning for offshore wind farm operation and maintenance activities. *Ocean Engineering* **101** 211–226.
- Dalgic, Y., I. Lazakis, O. Turan. 2013. Vessel charter rate estimation for offshore wind O&M activities. C. Guedes Soares, F. López Peña, eds., *Developments in Maritime Transportation and Exploitation of Sea Resources*. CRC Press, Boca Raton, 899–907.
- Dalgic, Y., I. Lazakis, O. Turan. 2015b. Investigation of optimum crew transfer vessel fleet for offshore wind farm maintenance operations. *Wind Engineering* **39**(1) 31–52.

- Dalgic, Y., I. Lazakis, O. Turan, S. Judah. 2015c. Investigation of optimum jack-up vessel chartering strategy for offshore wind farm O&M activities. *Ocean Engineering* **95** 106–115.
- De Jonge, B., E. Jakobsons. 2018. Optimizing block-based maintenance under random machine usage. *European Journal of Operational Research* **265**(2) 703–809.
- De Jonge, B., W. Klingenberg, R. H. Teunter, T. Tinga. 2016. Reducing costs by clustering maintenance activities for multiple critical units. *Reliability Engineering & System Safety* **145** 93–103.
- De Jonge, B., P. A. Scarf. 2019. A review on maintenance optimization. *European Journal of Operational Research* In press.
- De Jonge, B., R. H. Teunter, T. Tinga. 2017. The influence of practical factors on the benefits of condition-based maintenance over time-based maintenance. *Reliability Engineering & System Safety* **158** 21–30.
- Deutsch, J., D. He. 2018. Using deep learning-based approach to predict remaining useful life of rotating components. *IEEE Transactions on Systems, Man, and Cybernetics: Systems* **48**(1) 11–20.
- Ding, S. H., S. Kamaruddin. 2015. Maintenance policy optimization—literature review and directions. *The International Journal of Advanced Manufacturing Technology* **76**(5) 1263–1283.
- Do, P., R. Assaf, P. Scarf, B. Iung. 2019. Modelling and application of condition-based maintenance for a two-component system with stochastic and economic dependencies. *Reliability Engineering & System Safety* **182** 86–97.
- Do, P., A. Barros, C. Béranger, K. Bouvard, F. Brissaud. 2013. Dynamic grouping maintenance with time limited opportunities. *Reliability Engineering & System Safety* **120** 51–59.
- Do, P., P. Scarf, B. Iung. 2015. Condition-based maintenance for a two-component system with dependencies. *IFAC-PapersOnLine* **48**(21) 946–951.
- Dolinšek, S., B. Šuštaršič, J. Kopač. 2001. Wear mechanisms of cutting tools in high-speed cutting processes. *Wear* **250**(1) 349–356.
- Doroudi, S., B. Fralix, M. Harchol-Balter. 2017. Clearing analysis on phases: Exact limiting probabilities for skip-free, unidirectional, quasi-birth-death processes. *Stochastic Systems* **6**(2) 420–458.
- Doshi, B.T. 1986. Queueing systems with vacations - a survey. *Queueing Systems* **1** 29–66.
- Drexl, M., M. Schneider. 2015. A survey of variants and extensions of the location-routing problem. *European Journal of Operational Research* **241**(2) 283–308.
- Dutch government. 2018. *Kamerbrief Routekaart windenergie op zee 2030*. [www.rijksoverheid.nl/onderwerpen/duurzame-energie/nieuws/2018/03/27/kabinet-maakt-plannen-bekend-voor-windparken-op-zee-2024-2030](http://www.rijksoverheid.nl/onderwerpen/duurzame-energie/nieuws/2018/03/27/kabinet-maakt-plannen-bekend-voor-windparken-op-zee-2024-2030) (accessed September 24th, 2019).

- Enthoven, D. L. J. U., B. Jargailsaikhon, K. J. Roodbergen, M. A. J. uit het Broek, A. H. Schrotenboer. 2020. The two-echelon vehicle routing problem with covering options. *Computers & Operations Research* In press.
- European Commission. 2011. *Energy Roadmap 2050*. <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2050-energy-strategy> (accessed September 24th, 2019).
- Feinberg, E. A., O. Kella. 2002. Optimality of  $D$ -policies for an  $M/G/1$  queue with a removable server. *Queueing Systems* **42**(4) 355–376.
- Feng, Q., J. G. Shanthikumar. 2018. How research in production and operations management may evolve in the era of big data. *Production and Operations Management* **27**(9) 1670–1684.
- Feng, Y., Y. Qiu, C. J. Crabtree, H. Long, P. J. Tavner. 2013. Monitoring wind turbine gearboxes. *Wind Energy* **16**(5) 728–740.
- Fernández, E., G. Laporte, J. Rodríguez-Pereira. 2017. A branch-and-cut algorithm for the multidepot rural postman problem. *Transportation Science* **52**(2) 353–369.
- Filus, J. 1987. The load optimization of a repairable system with gamma-distributed time-to-failure. *Reliability Engineering* **18**(4) 275–284.
- Financial Times. 2017. *Dong Energy breaks subsidy link with new offshore wind farms*. [www.ft.com/content/f5b164a6-20f8-11e7-b7d3-163f5a7f229c](http://www.ft.com/content/f5b164a6-20f8-11e7-b7d3-163f5a7f229c) (accessed April 26th, 2018).
- Fırtın, E., Ö. Güler, S. A. Akdağ. 2011. Investigation of wind shear coefficients and their effect on electrical energy generation. *Applied Energy* **88**(11) 4097–4105.
- Fischetti, M. 1991. Facets of the asymmetric traveling salesman polytope. *Mathematics of Operations Research* **16**(1) 42–56.
- Fischetti, M., A. Lodi, S. Martello, P. Toth. 2001. A polyhedral approach to simplified crew scheduling and vehicle scheduling problems. *Management Science* **47**(6) 833–850.
- Fischetti, M., A. Lodi, P. Toth. 2007. Exact methods for the asymmetric traveling salesman problem. G. Gutin, A. P. Punnen, eds., *The Traveling Salesman Problem and Its Variations*. Springer, Boston, MA, 169–205.
- Fischetti, M., P. Toth. 1997. A polyhedral approach to the asymmetric traveling salesman problem. *Management Science* **43**(11) 1520–1536.
- Fischetti, M., P. Toth, D. Vigo. 1994. A branch-and-bound algorithm for the capacitated vehicle routing problem on directed graphs. *Operations Research* **42**(5) 846–859.
- Francie, K. A., K. Jean-Pierre, D. Pierre, S. Victor, P. Vladimir. 2014. Stochastic optimal control of manufacturing systems under production-dependent failure rates. *International Journal of Production Economics* **150** 174–187.
- Frankfurt School. 2015. *Global Trends in Renewable Energy Investment 2015*. <http://fs-unep-centre.org/publications/global-trends-renewable-energy-investment-2015> (accessed April 26th, 2018).

- Frisk, M., M. Göthe-Lundgren, K. Jörnsten, M. Rönnqvist. 2010. Cost allocation in collaborative forest transportation. *European Journal of Operational Research* **205**(2) 448–458.
- Gandhi, A., S. Doroudi, M. Harchol-Balter, A. Scheller-Wolf. 2014. Exact analysis of the  $M/M/k$ /Setup class of Markov chains via recursive renewal reward. *Queueing Systems* **77**(2) 177–209.
- Gandhi, A., V. Gupta, M. Harchol-Balter, M. A. Kozuch. 2010a. Optimality analysis of energy-performance trade-off for server farm management. *Performance Evaluation* **67**(11) 1155–1171.
- Gandhi, A., M. Harchol-Balter, I. Adan. 2010b. Server farms with setup costs. *Performance Evaluation* **67**(11) 1123–1138.
- Gouveia, L., J. Riera-Ledesma, J. J. Salazar-González. 2013. Reverse multistar inequalities and vehicle routing problems with a lower bound on the number of customers per route. *Networks* **61**(4) 309–321.
- Gräber, U. 2004. Advanced maintenance strategies for power plant operators introducing inter-plant life cycle management. *International Journal of Pressure Vessels and Piping* **81**(10-11) 861–865.
- Grötschel, M., M. W. Padberg. 1985. Polyhedral theory. E. L. Lawler, J. K. Lenstra, A. H. G. Rinnooy Kan, D. B. Shmoys, eds., *The Traveling Salesman Problem: A Guided Tour of Combinatorial Optimization*. Wiley New York, 251–305.
- Halvorsen-Weare, E. E., C. Gundegjerde, I. B. Halvorsen, L. M. Hvattum, L.M. Nonås. 2013. Vessel fleet analysis for maintenance operations at offshore wind farms. *Energy Procedia* **35** 167–176.
- Henriquez, P., J. B. Alonso, M. A. Ferrer, C. M. Travieso. 2014. Review of automatic fault diagnosis systems using audio and vibration signals. *IEEE Transactions on Systems, Man, and Cybernetics: Systems* **44**(5) 642–652.
- Heyman, D. P. 1977. The  $T$ -policy for the  $M/G/1$  queue. *Management Science* **23**(7) 775–778.
- Hu, J. Q., P. Vakili, G. X. Yu. 1994. Optimality of hedging point policies in the production control of failure prone manufacturing systems. *IEEE Transactions on Automatic Control* **39**(9) 1875–1880.
- Huynh, K. T., A. Barros, C. Berenguer, I. T. Castro. 2011. A periodic inspection and replacement policy for systems subject to competing failure modes due to degradation and traumatic events. *Reliability Engineering & System Safety* **96**(4) 497–508.
- Iravani, S. M. R., I. Duenyas. 2002. Integrated maintenance and production control of a deteriorating production system. *IIE Transactions* **34**(5) 423–435.
- Iravani, S. M. R., V. Krishnamurthy. 2007. Workforce agility in repair and maintenance environments. *Manufacturing & Service Operations Management* **9**(2) 168–184.

- Irawan, C. A., D. Ouelhadj, D. Jones, M. Stålhane, I. B. Sperstad. 2017. Optimisation of maintenance routing and scheduling for offshore wind farms. *European Journal of Operational Research* **256**(1) 76–89.
- IRENA. 2018. Renewable power generation costs in 2017. Tech. rep., International Renewable Energy Agency, Abu Dhabi.
- Iyer, R. K., D. J. Rossetti. 1986. A measurement-based model for workload dependence of cpu errors. *IEEE Transactions on Computers* **100**(6) 511–519.
- Kazaz, B., T. W. Sloan. 2008. Production policies under deteriorating process conditions. *IIE Transactions* **40**(3) 187–205.
- Kazaz, B., T. W. Sloan. 2013. The impact of process deterioration on production and maintenance policies. *European Journal of Operational Research* **227**(1) 88–100.
- Kemeny, J. G., J. L. Snell. 1976. *Finite Markov Chains*. Springer-Verlag, New York.
- Khaleghei, A., V. Makis. 2016. Reliability estimation of a system subject to condition monitoring with two dependent failure modes. *IIE Transactions* **48**(11) 1058–1071.
- Kim, M. J., V. Makis. 2013. Joint optimization of sampling and control of partially observable failing systems. *Operations Research* **61**(3) 777–790.
- Kusiak, A., W. Li. 2011. The prediction and diagnosis of wind turbine faults. *Renewable Energy* **36**(1) 16–23.
- Lahyani, R., L. C. Coelho, J. Renaud. 2018. Alternative formulations and improved bounds for the multi-depot fleet size and mix vehicle routing problem. *OR Spectrum* **40**(1) 125–157.
- Lan, W. M., T. L. Olsen. 2006. Multiproduct systems with both setup times and costs: Fluid bounds and schedules. *Operations Research* **54**(3) 505–522.
- Laporte, G., Y. Nobert, S. Taillefer. 1988. Solving a family of multi-depot vehicle routing and location-routing problems. *Transportation Science* **22**(3) 161–172.
- Leimeister, M., A. Kolios. 2018. A review of reliability-based methods for risk analysis and their application in the offshore wind industry. *Renewable and Sustainable Energy Reviews* **91** 1065–1076.
- Leite, G. N. P., A. M. Araújo, P. A. C. Rosas. 2018. Prognostic techniques applied to maintenance of wind turbines: a concise and specific review. *Renewable and Sustainable Energy Reviews* **81** 1917–1925.
- Letchford, A. N., R. W. Eglese, J. Lysgaard. 2002. Multistars, partial multistars and the capacitated vehicle routing problem. *Mathematical Programming* **94** 21–40.
- Letchford, A. N., J. J. Salazar-González. 2006. Projection results for vehicle routing. *Mathematical Programming* **105**(2-3) 251–274.
- Letchford, A. N., J. J. Salazar-González. 2015. Stronger multi-commodity flow formulations of the capacitated vehicle routing problem. *European Journal of Operational Research* **244**(3) 730–738.



- Li, H., E. Deloux, L. Dieulle. 2016. A condition-based maintenance policy for multi-component systems with lévy copulas dependence. *Reliability Engineering & System Safety* **149** 44–55.
- Li, P., L. Li, G. Song, Y. Yu. 2014. Wireless sensing and vibration control with increased redundancy and robustness design. *IEEE Transactions on Cybernetics* **44**(11) 2076–2087.
- Liberopoulos, G., M. Caramanis. 1994. Production control of manufacturing systems with production rate-dependent failure rates. *IEEE Transactions on Automatic Control* **39**(4) 889–895.
- Lindqvist, M., J. Lundin. 2010. Spare part logistics and optimization for wind turbines: methods for cost-effective supply and storage. Uppsala Universitet, Uppsala, Sweden.
- Liu, B., S. Wu, M. Xie, W. Kuo. 2017a. A condition-based maintenance policy for degrading systems with age-and state-dependent operating cost. *European Journal of Operational Research* **263**(3) 879–887.
- Liu, G. S., Y. Zhou, H. D. Yang. 2017b. Minimizing energy consumption and tardiness penalty for fuzzy flow shop scheduling with state-dependent setup time. *Journal of Cleaner Production* **147** 470–484.
- Liu, X., J. Li, K. N. Al-Khalifa, A. S. Hamouda, D. W. Coit, E. A. Elsayed. 2013. Condition-based maintenance for continuously monitored degrading systems with multiple failure modes. *IIE Transactions* **45**(4) 422–435.
- Loehman, E. T., R. Kiser, S. J. Rassenti. 2014. Cost share adjustment processes for cooperative group decisions about shared goods: a design approach. *Group Decision and Negotiation* **23**(5) 1085–1126.
- Lu, L., J. Jiang. 2007. Analysis of on-line maintenance strategies for k-out-of-n standby safety systems. *Reliability Engineering & System Safety* **92**(2) 144–155.
- Lu, Z., W. Cui, X. Han. 2015. Integrated production and preventive maintenance scheduling for a single machine with failure uncertainty. *Computers & Industrial Engineering* **80** 236–244.
- Lydia, M., S. S. Kumar, A. I. Selvakumar, G. E. P. Kumar. 2014. A comprehensive review on wind turbine power curve modeling techniques. *Renewable and Sustainable Energy Reviews* **30** 452–460.
- Lysgaard, J., A. N. Letchford, R. W. Eglese. 2004. A new branch-and-cut algorithm for the capacitated vehicle routing problem. *Mathematical Programming* **100**(2) 423–445.
- Maccio, V. J., D. G. Down. 2018. Structural properties and exact analysis of energy-aware multiserver queueing systems with setup times. *Performance Evaluation* **121** 48–66.
- Mak, V., A. T. Ernst. 2007. New cutting-planes for the time-and/or precedence-constrained ATSP and directed VRP. *Mathematical Methods of Operations Research* **66**(1) 69–98.
- Makis, V., X. Jiang. 2003. Optimal replacement under partial observations. *Mathematics of Operations Research* **28**(2) 382–394.

- Manwell, J. F., J. G. McGowan, A. L. Rogers. 2010. *Wind energy explained: theory, design and application*. John Wiley & Sons.
- Marseguerra, M., E. Zio, L. Podofillini. 2002. Condition-based maintenance optimization by means of genetic algorithms and monte carlo simulation. *Reliability Engineering & System Safety* **77**(2) 151–165.
- Martin, N., L. Verdonck, A. Caris, B. Depaire. 2018. Horizontal collaboration in logistics: decision framework and typology. *Operations Management Research* 1–19.
- Martin, R., I. Lazakis, S. Barbouchi, L. Johanning. 2016. Sensitivity analysis of offshore wind farm operation and maintenance cost and availability. *Renewable Energy* **85** 1226–1236.
- Martinelli, F. 2005. Control of manufacturing systems with a two-value, production-dependent failure rate. *Automatica* **41**(11) 1943–1948.
- Martinelli, F. 2007. Optimality of a two-threshold feedback control for a manufacturing system with a production dependent failure rate. *IEEE Transactions on Automatic Control* **52**(10) 1937–1942.
- Martinelli, F. 2010. Manufacturing systems with a production dependent failure rate: structure of optimality. *IEEE Transactions on Automatic Control* **55**(10) 2401–2406.
- McKone, K. E., E. N. Weiss. 2002. Guidelines for implementing predictive maintenance. *Production and Operations Management* **11**(2) 109–124.
- McMillan, D., I. A. Dinwoodie. 2013. Forecasting long term jack up vessel demand for offshore wind. *ESREL 2013* .
- Min, H., V. Jayaraman, R. Srivastava. 1998. Combined location-routing problems: A synthesis and future research directions. *European Journal of Operational Research* **108**(1) 1–15.
- Mula, J., R. Poler, J. P. Garcia-Sabater, F. C. Lario. 2006. Models for production planning under uncertainty: A review. *International Journal of Production Economics* **103**(1) 271–285.
- Nagy, G., S. Salhi. 2007. Location-routing: Issues, models and methods. *European journal of operational research* **177**(2) 649–672.
- Nesello, V., A. Subramanian, M. Battarra, G. Laporte. 2018. Exact solution of the single-machine scheduling problem with periodic maintenances and sequence-dependent setup times. *European Journal of Operational Research* **266**(2) 498–507.
- Noourelfath, M., F. Yalaoui. 2012. Integrated load distribution and production planning in series-parallel multi-state systems with failure rate depending on load. *Reliability Engineering & System Safety* **106** 138–145.
- Olde Keizer, M. C. A., S. D. P. Flapper, R. H. Teunter. 2017a. Condition-based maintenance policies for systems with multiple dependent components: A review. *European Journal of Operational Research* **261**(2) 405–420.
- Olde Keizer, M. C. A., R. H. Teunter, J. Veldman. 2016. Clustering condition-based maintenance for systems with redundancy and economic dependencies. *European Journal of Operational Research* **251**(2) 531–540.

- Olde Keizer, M. C. A., R. H. Teunter, J. Veldman. 2017b. Joint condition-based maintenance and inventory optimization for systems with multiple components. *European Journal of Operational Research* **257**(1) 209–222.
- Olde Keizer, M. C. A., R. H. Teunter, J. Veldman, M. Z. Babai. 2018. Condition-based maintenance for systems with economic dependence and load sharing. *International Journal of Production Economics* **195** 319–327.
- Olsen, T. L., B. Tomlin. 2019. Industry 4.0: opportunities and challenges for operations management. *Manufacturing & Service Operations Management* In press.
- Özener, O. Ö., Ö. Ergun. 2008. Allocating costs in a collaborative transportation procurement network. *Transportation Science* **42**(2) 146–165.
- Panagiotidou, S., G. Tagaras. 2010. Statistical process control and condition-based maintenance: a meaningful relationship through data sharing. *Production and operations management* **19**(2) 156–171.
- Paraskevopoulos, D. C., G. Laporte, P. P. Repoussis, C. D. Tarantilis. 2017. Resource constrained routing and scheduling: Review and research prospects. *European Journal of Operational Research* **263**(3) 737–754.
- Paté-Cornell, M. E., H. L. Lee, G. Tagaras. 1987. Warnings of malfunction: the decision to inspect and maintain production processes on schedule or on demand. *Management Science* **33**(10) 1277–1290.
- Peng, H., G. J. van Houtum. 2016. Joint optimization of condition-based maintenance and production lot-sizing. *European Journal of Operational Research* **253**(1) 94–107.
- Pérez, J. M. P., F. P. G. Márquez, A. Tobias, M. Papaelias. 2013. Wind turbine reliability analysis. *Renewable and Sustainable Energy Reviews* **23** 463–472.
- Phung-Duc, T. 2017. Exact solutions for  $M/M/c$ /Setup queues. *Telecommunication Systems* **64**(2) 309–324.
- Pinedo, M. L. 2016. *Scheduling: Theory, Algorithms, and Systems*. Springer, New York.
- Pomponi, F., L. Fratocchi, S. Rossi Tafuri. 2015. Trust development and horizontal collaboration in logistics: a theory based evolutionary framework. *Supply Chain Management: An International Journal* **20**(1) 83–97.
- Post, R. M., P. Buijs, M. A. J. uit het Broek, J. A. Lopez Alvarez, N. B. Szirbik, I. F. A. Vis. 2018. A solution approach for deriving alternative fuel station infrastructure requirements. *Flexible Services and Manufacturing Journal* **30**(3) 592–607.
- Prodhon, C., C. Prins. 2014. A survey of recent research on location-routing problems. *European Journal of Operational Research* **238**(1) 1–17.
- Puterman, M. 1994. *Markov decision processes: Discrete stochastic dynamic programming*. John Wiley & Sons, New York.
- Rasmekomen, N., A.K. Parlikad. 2016. Condition-based maintenance of multi-component systems with degradation state-rate interactions. *Reliability Engineering & System Safety* **148** 1–10.

- Reddy, K. G. V., R. Nadarajan, R. Arumuganathan. 1998. Analysis of a bulk queue with  $n$ -policy multiple vacations and setup times. *Computers & Operations Research* **25**(11) 957–967.
- Rivera-Gómez, H., O. Montaña-Arango, J. R. Corona-Armenta, J. Garnica-González, E. S. Hernández-Gress, I. Barragán-Vite. 2018. Production and maintenance planning for a deteriorating system with operation-dependent defectives. *Applied Sciences* **8**(2) 165.
- Röckmann, C., S. Lagerveld, J. Stavenuiter. 2017. Operation and maintenance costs of offshore wind farms and potential multi-use platforms in the dutch north sea. B. H. Buck, R. Langan, eds., *Aquaculture Perspective of Multi-Use Sites in the Open Ocean: The Untapped Potential for Marine Resources in the Anthropocene*. Springer, Cham, 97–113.
- Rodrigues, S., C. Restrepo, E. Kontos, R. T. Pinto, P. Bauer. 2015. Trends of offshore wind projects. *Renewable and Sustainable Energy Reviews* **49** 1114–1135.
- Rudin, W. 1976. *Principles of mathematical analysis*. McGraw-Hill, New York.
- Sahba, P., B. Balciog. 2011. The impact of transportation delays on repair shop capacity pooling and spare part inventories. *European Journal of Operational Research* **214**(3) 674–682.
- Samuelson, A., A. Haigh, M. M. O'Reilly, N. G. Bean. 2017. Stochastic model for maintenance in continuously deteriorating systems. *European Journal of Operational Research* **259**(3) 1169–1179.
- Schneider, M., M. Drexler. 2017. A survey of the standard location-routing problem. *Annals of Operations Research* **259**(1-2) 389–414.
- Schrotenboer, A. H., M. A. J. uit het Broek, B. Jargalsaikhan, K. J. Roodbergen. 2018. Coordinating technician allocation and maintenance routing for offshore wind farms. *Computers & Operations Research* **98** 185–197.
- Schrotenboer, A. H., E. Ursavas, I. F. A. Vis. 2019. A branch-and-price-and-cut algorithm for resource constrained pickup and delivery problems. *Transportation Science* **53**(4) 1001–1022.
- Sethi, S. P., G. L. Thompson. 2000. *Optimal Control Theory: Applications to Management Science and Economics*. 2nd ed. Springer, New York.
- Sethi, S. P., H. Yan, H. Zhang, Q. Zhang. 2002. Optimal and hierarchical controls in dynamic stochastic manufacturing systems: A survey. *Manufacturing & Service Operations Management* **4**(2) 133–170.
- Shafiee, M. 2015a. A fuzzy analytic network process model to mitigate the risks associated with offshore wind farms. *Expert Systems with Applications* **42**(4) 2143–2152.
- Shafiee, M. 2015b. Maintenance logistics organization for offshore wind energy: current progress and future perspectives. *Renewable Energy* **77** 182–193.
- Shen, L., S. Dauzère-Pérès, J. S. Neufeld. 2018. Solving the flexible job shop scheduling problem with sequence-dependent setup times. *European Journal of Operational Research* **265**(2) 503–516.

- Shen, W., I. Duenyas, Kapuscinski R. 2014. Optimal pricing, production, and inventory for new product diffusion under supply constraints. *Manufacturing & Service Operations Management* **16**(1) 28–45.
- Siemens. 2018. *Service portfolio*. <https://www.energy.siemens.com/apps/features/service-portfolio/reliability/logistics/index.html\#jack-up-vessel> (accessed July 16th, 2018).
- Slaugh, V. W., B. Biller, S. R. Tayur. 2016. Managing rentals with usage-based loss. *Manufacturing & Service Operations Management* **18**(3) 429–444.
- Sloan, T. W. 2004. A periodic review production and maintenance model with random demand, deteriorating equipment, and binomial yield. *Journal of the Operational Research Society* **55**(6) 647–656.
- Sloan, T. W., J. G. Shanthikumar. 2000. Combined production and maintenance scheduling for a multiple-product, single-machine production system. *Production and Operations Management* **9**(4) 379–399.
- Sloan, T. W., J. G. Shanthikumar. 2002. Using in-line equipment condition and yield information for maintenance scheduling and dispatching in semiconductor wafer fabs. *IIE Transactions* **34**(2) 191–209.
- Soosay, C. A., P. Hyland. 2015. A decade of supply chain collaboration and directions for future research. *Supply Chain Management: An International Journal* **20**(6) 613–630.
- Sperstad, I. B., F. D. McAuliffe, M. Kolstad, S. Sjømark. 2016. Investigating key decision problems to optimize the operation and maintenance strategy of offshore wind farms. *Energy Procedia* **94** 261–268.
- Sperstad, I. B., M. Stålhane, I. Dinwoodie, O. E. V. Endrerud, R. Martin, E. Warner. 2017. Testing the robustness of optimal access vessel fleet selection for operation and maintenance of offshore wind farms. *Ocean Engineering* **145** 334–343.
- Stålhane, M., M. Christiansen, O. Kirkeby, A. J. Mikkelsen. 2017. Optimizing jack-up vessel strategies for maintaining offshore wind farms. *Energy Procedia* **137** 291–298.
- The Crown Estate. 2014. *Jack-up vessel optimisation: Improving offshore wind performance through better use of jack-up vessels in the operations and maintenance phase*.
- Tijms, H. C. 1994. *Stochastic Models: An Algorithmic Approach*. John Wiley & Sons, Chichester.
- Topham, E., D. McMillan. 2017. Sustainable decommissioning of an offshore wind farm. *Renewable Energy* **102** 470–480.
- Uit het Broek, M. A. J., A. H. Schrottenboer, B. Jargalsaikhan, K. J. Roodbergen, L. C. Coelho. 2020. Asymmetric multi-depot vehicle routing problems: valid inequalities and a branch-and-cut algorithm. *Operations Research* Forthcoming.
- Uit het Broek, M. A. J, R. H. Teunter, B. de Jonge, J. Veldman. 2019a. Joint condition-based maintenance and condition-based production optimization. Under review.

- Uit het Broek, M. A. J., R. H. Teunter, B. de Jonge, J. Veldman. 2019b. Joint condition-based maintenance and load-sharing optimization for multi-unit systems with economic dependency. Under review.
- Uit het Broek, M. A. J., R. H. Teunter, B. de Jonge, J. Veldman, N. D. van Foreest. 2019c. Condition-based production planning: adjusting production rates to balance output and failure risk. *Manufacturing & Service Operations Management* In press.
- Uit het Broek, M. A. J., G. van der Heide, N. D. van Foreest. 2019d. Energy-saving policies for temperature-controlled production systems with state-dependent setup times and costs. Revision.
- Uit het Broek, M. A. J., J. Veldman, S. Fazi, R. Greijdanus. 2019e. Evaluating resource sharing for offshore wind farm maintenance: the case of jack-up vessels. *Renewable and Sustainable Energy Reviews* **109** 619–632.
- UNEP. 2015. *Renewables 2015 Global Status Report*. [http://www.ren21.net/wp-content/uploads/2015/07/REN12-GSR2015\\_Onlinebook\\_low1.pdf](http://www.ren21.net/wp-content/uploads/2015/07/REN12-GSR2015_Onlinebook_low1.pdf) (accessed April 26th, 2018).
- Van Noortwijk, J. M. 2009. A survey of the application of gamma processes in maintenance. *Reliability Engineering & System Safety* **94**(1) 2–21.
- Vanovermeire, C., K. Sörensen, A. Van Breedam, B. Vannieuwenhuyse, S. Verstrepen. 2014. Horizontal logistics collaboration: decreasing costs through flexibility and an adequate cost allocation strategy. *International Journal of Logistics Research and Applications* **17**(4) 339–355.
- Wang, L., E. Zheng, Y. Li, B. Wang, J. Wu. 2009. Maintenance optimization of generating equipment based on a condition-based maintenance policy for multi-unit systems. *2009 Chinese Control and Decision Conference*. IEEE, 2440–2445.
- Wang, W. 2008. An enhanced diagnostic system for gear system monitoring. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)* **38**(1) 102–112.
- Wangler, L. U. 2013. Renewables and innovation: did policy induced structural change in the energy sector effect innovation in green technologies? *Journal of Environmental Planning and Management* **56**(2) 211–237.
- Welch, P. D. 1964. On a generalized  $M/G/1$  queuing process in which the first customer of each busy period receives exceptional service. *Operations Research* **12**(5) 736–752.
- Wireman, T. 2014. *Benchmarking Best practices for maintenance, reliability and asset management*. 3rd ed. Industrial Press Inc, South Norwalk, CT.
- Yadin, M., P. Naor. 1963. Queueing systems with a removable service station. *Journal of the Operational Research Society* **14**(4) 393–405.
- Yu, Y., S. Benjaafar, Y. Gerchak. 2015. Capacity sharing and cost allocation among independent firms with congestion. *Production and Operations Management* **24**(8) 1285–1310.

- Zhang, T., R. Dwight, K. El-Akruti. 2015a. Condition based maintenance and operation of wind turbines. P. W. Tse, J. Mathew, K. Wong, R. Lam, C. N. Ko, eds., *Engineering Asset Management-Systems, Professional Practices and Certification*. Springer, Cham, 1013–1025.
- Zhang, X., J. Zeng. 2017. Joint optimization of condition-based opportunistic maintenance and spare parts provisioning policy in multiunit systems. *European Journal of Operational Research* **262**(2) 479–498.
- Zhang, Z., S. Wu, S. Lee, J. Ni. 2014. Modified iterative aggregation procedure for maintenance optimisation of multi-component systems with failure interaction. *International Journal of Systems Science* **45**(12) 2480–2489.
- Zhang, Z., S. Wu, B. Li, S. Lee. 2015b.  $(n, N)$  type maintenance policy for multi-component systems with failure interactions. *International Journal of Systems Science* **46**(6) 1051–1064.
- Zhang, Z. G., L. Tadj, M. Bounkhel. 2011. Cost evaluation in  $M/G/1$  queue with  $T$ -policy revisited, technical note. *European Journal of Operational Research* **214**(3) 814–817.
- Zhao, X., B. Liu, Y. Liu. 2018. Reliability modeling and analysis of load-sharing systems with continuously degrading components. *IEEE Transactions on Reliability* **67**(3) 1096–1110.
- Zhou, Y., T.R. Lin, Y. Sun, L. Ma. 2016. Maintenance optimisation of a parallel-series system with stochastic and economic dependence under limited maintenance capacity. *Reliability Engineering & System Safety* **155** 137–146.
- Zhou, Y., Z. Zhang, T.R. Lin, L. Ma. 2013. Maintenance optimisation of a multi-state series-parallel system considering economic dependence and state-dependent inspection intervals. *Reliability Engineering & System Safety* **111** 248–259.
- Zied, H., D. Sofiene, R. Nidhal. 2011. Optimal integrated maintenance/production policy for randomly failing systems with variable failure rate. *International Journal of Production Research* **49**(19) 5695–5712.
- Zio, E., M. Compare. 2013. Evaluating maintenance policies by quantitative modeling and analysis. *Reliability Engineering & System Safety* **109** 53–65.